


10/688,862
Feb 19 2004

(19)  **Europäisches Patentamt**
European Patent Office
Office européen des brevets



(11) **EP 1 120 785 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.08.2001 Bulletin 2001/31

(51) Int Cl.7: **G11B 17/08, G11B 7/26**

(21) Application number: **01300684.6**

(22) Date of filing: **25.01.2001**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: **26.01.2000 JP 2000017151**
27.12.2000 JP 2000397630

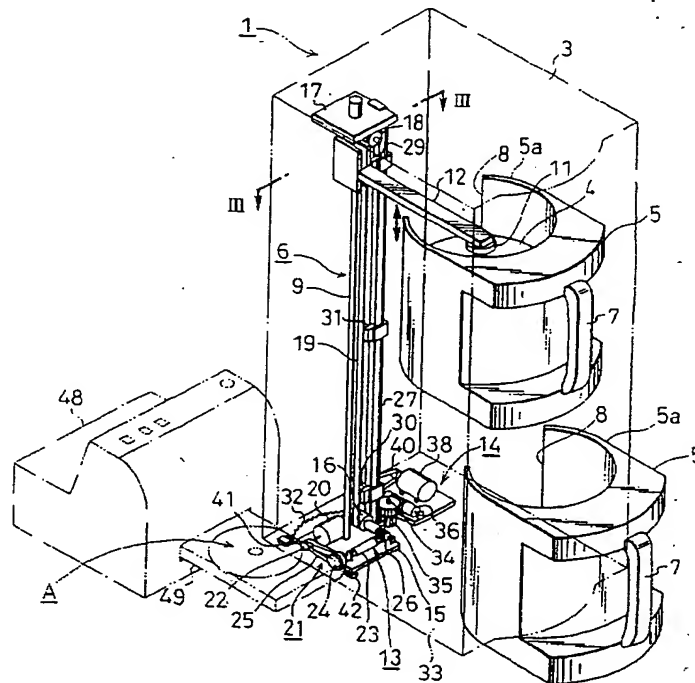
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(54) **Compact disc feeder**

(57) A housing (1) includes upper and lower holders (5) in which a number of compact discs are stored. An arm (12) is provided so that the proximal end may turn around a vertical shaft in the housing, and the distal end of the arm holds one of the compact discs in the upper

holder. The arm turns sideward through an opening of the housing, and lowers along the vertical shaft to transfer the compact disc to a tray which is drawn from a printer. The compact disc is printed in the printer, held by the end of the arm again and transferred to the lower holder in the housing.

FIG. 2



ed into the printer 48 after the arm 12 is elevated, and the CD 4 is printed.

[0033] After completion of printing of the CD 4, the tray 49 is drawn out, and the arm 12 is lowered to the transfer position "A", at which the printed CD 4 is kept by the holding unit 11. The arm 12 is elevated to the intermediate position at which the height detecting sensor 31 is actuated, and the arm 12 is turned by the turning unit 14 from the sideward position to the forward position. The arm 12 which holds the CD 4 comes through the lower horizontal opening portion of the opening 44.

[0034] When the arm 12 comes to the forward position, the CD 4 held by the holding unit 11 is located right above the lower holder 5. The arm 12 is lowered to a predetermined height through the opening 8 of the lower holder 5. The printed CD 4 is released from the holding unit 11 and stored in the lower holder 5.

[0035] Thereafter, the arm 12 is elevated to the above intermediate height, and is turned sideward. The, the arm 12 is elevated to the highest position, and rotated to the forward position again. By repeating the operation, an unprinted CD 4 is taken out of the upper holder 5 one by one, and fed to the tray 49 of the printer 48, and the CD 4 which is printed and drawn from the printer 48 is stacked in the lower holder 5.

[0036] The disc memory may be CD-R, CD-RW or DVD instead of CD.

[0037] The holder 5 is not only equipped in the feeder, but also is used alone to store a number of CD. The handle 7 is advantageous for conveying, and the opening 8 may be used to find stored amount of the CD 4.

[0038] Fig. 7 illustrates the second embodiment of the present invention. The same numerals are allotted to the same members as those in the first embodiment, and detailed description therefor is omitted.

[0039] In the second embodiment, a housing 60 comprises a rectangular portion 16 and a lobe 62 on the front surface. In the lobe 62, a holder receiver 63 is formed to receive a holder 5 which can be taken out of the receiver 62 and is similar to that in the first embodiment. A transfer device receiving portion 64 is formed in the lobe 2 and the rectangular portion 61 to receive a transfer device 6 similar to the above, and a processing unit receiving portion 65 is formed in a portion except the transfer device receiving portion 64 in the rectangular portion 61.

[0040] As processing unit, in this embodiment, a duplicator 66 and two CD label printers 67, 68 are stacked. In trays 66a, 66b, 67a, 68a which are drawn from the duplicator 66 and the printers 67, 68, the centers of receiving portions 69 are formed to coincide with a holding unit 11 in which an arm 12 is directed sideward. The duplicator 66 and the printers 67, 68 may be known structures, and their details are omitted.

[0041] On the lobe 62, an opening 70 is formed, and has horizontal opening portions 70a, 70b at positions slightly upper and lower than the holder 5 in the holder receiver 63 to allow turning of the arm 12 between for-

ward and sideward positions; a vertical opening portion 70c for allowing elevation of the sideward arm 12 between slightly upper portion than the upper tray 68a of the duplicator 66 and the tray 68a of the lower printer 68; and vertical opening portions 70d, 70e which communicate with the horizontal opening portions 70a, 70b.

[0042] At a sideward position in which the arm 12 is put through the vertical opening 70c, the arm 12 is lowered to heights at which the CD 4 is received to each of the trays 66a, 66b, 67a, 68a, and the heights are defined to the first receiving position, and the arm 12 is lowered through the lower vertical opening portion 70e to the second receiving position, in which the CD 4 completed as to reading and writing and printing of a label is sent to another conveying device (not shown).

[0043] The second embodiment achieves similar advantages to those in the first embodiment, and the duplicator 66 and the printers 67, 68 are placed in the housing, thereby attaining fast automatic continuous treatment efficiently by a single device. Further, by avoiding problem that it is blocked by drawing the trays from the printers and duplicator to take CD out of the holder as disclosed U.S. Patent No. 5,734,629, there is advantage.

[0044] In the second embodiment, the holder receiver 63 may be formed at the upper part of the front surface of the lobe 60, and the second receiving position is set under the position. But the holder receiving portion 63 may be provided at the lower portion of the front surface of the lobe 62, and the second receiving position may be provided above it.

[0045] The foregoing merely relate to embodiments of the invention. Various changes and modifications may be made by person skilled in the art without departing from the scope of claims wherein:

Claims

1. A compact disc feeder which comprises:

a holder for storing a plurality of compact discs;
a transfer device; and
a housing which includes said holder and said transfer device, said transfer device being capable of turning and elevating from said holder to a predetermined transfer position of the compact disc.

2. A compact disc feeder as claimed in claim 1 wherein said housing includes upper and lower holders, one of the compact disc being held by the transfer device and transferred from one of the holders to the transfer position or the other holder.

3. A compact disc feeder as claimed in claim 1 wherein the transfer device comprises a horizontal arm in which a proximal end is connected to a vertical shaft

in the housing so that said arm may turn around the vertical shaft and elevate, a distal end of said arm having a holding unit which holds the compact disc, said transfer device further comprising an elevating unit for elevating said arm along the shaft, and a turning unit for turning said arm around the shaft.

4. A compact disc feeder as claimed in claim 3 wherein the holding unit comprises an elastic portion for holding the compact disc by pressing an inner surface of a central bore of the compact disc, and a pressing member for pressing a lower surface of the elastic portion to release the compact disc from the central bore.
5. A compact disc feeder as claimed in claim 3 wherein the elevating unit comprises a drive pulley on a lower horizontal plate fixed to a lower end of the vertical shaft, a driven pulley pivotally mounted on a lower surface of an upper horizontal plate fixed to an upper end of the vertical shaft, an endless belt wound between the two pulleys, a pulse motor on the lower horizontal plate, and a transmitting unit for transmitting rotational force of the motor to the drive pulley.
6. A compact disc feeder as claimed in claim 5 wherein the transmitting unit comprises a pulley fixed to a shaft of the pulse motor, a pulley fixed to an axial end of a worm provided in parallel with the pulse motor, an endless belt wound around the two pulleys, and a worm wheel integrally formed with the drive pulley and engaged with the worm.
7. A compact disc feeder as claimed in claim 3 wherein the turning unit comprises a sector gear fixed to a lower surface of the lower horizontal plate or the vertical shaft, a worm wheel pivotally mounted on a bottom plate of the housing, a worm pivotally mounted on the bottom plate and engaged with the worm wheel, a pulley mounted to an axial end of the worm, a reversible pulse motor on the bottom plate, a pulley mounted to a shaft of the reversible pulse motor and an endless belt wound between the two pulleys.
8. A compact disc feeder as claimed in claim 3 wherein a plurality of holders are stacked in the front of the housing, a vertical shaft being provided behind the holders, said arm turning between forward and sideward positions, the holding unit of the arm being matched with a center of the compact disc in the holder at the forward position of the arm, the sideward position of the arm being at the transfer position of the compact disc, an opening being formed at the side of the housing to allow turning and elevation of the arm which holds the compact disc.
9. A compact disc feeder as claimed in claim 8 wherein

said opening comprises an F-shape which comprises upper and lower horizontal opening portions for allowing turning of the arm and a vertical opening portion for allowing elevation of the arm which is directed sideward.

10. A compact disc feeder as claimed in claim 1 wherein height detecting sensors are provided at an upper limit, an intermediate position and a lower limit respectively at a connecting piece for connecting upper and lower horizontal plate, the intermediate position being slightly upper than the lower holder, thereby detecting that the arm comes to each of the positions by engaging with or getting close to the arm.
11. A compact disc feeder as claimed in claim 1 wherein a transparent or translucent side cover is detachably mounted to cover the compact disc and the transfer device which holds the compact disc.
12. A compact disc feeder as claimed in claim 1 wherein there is provided a processor which has a tray which can be drawn therefrom to receive the compact disc held at the transfer device.
13. A compact disc feeder as claimed in claim 12 wherein the processor comprises a printer.
14. A compact disc feeder as claimed in claim 12 wherein a plurality of processors are stacked in the housing.
15. A compact disc feeder as claimed in claim 14 wherein said plurality of processors comprise a printer for printing on the compact disc and a data reading and/or writing device for the compact discs.
16. A holder which comprises a cylindrical receiving portion for storing a plurality of stacked compact discs, a handle at one side of an outer surface of the holder; and an opening at the other side to the handle.

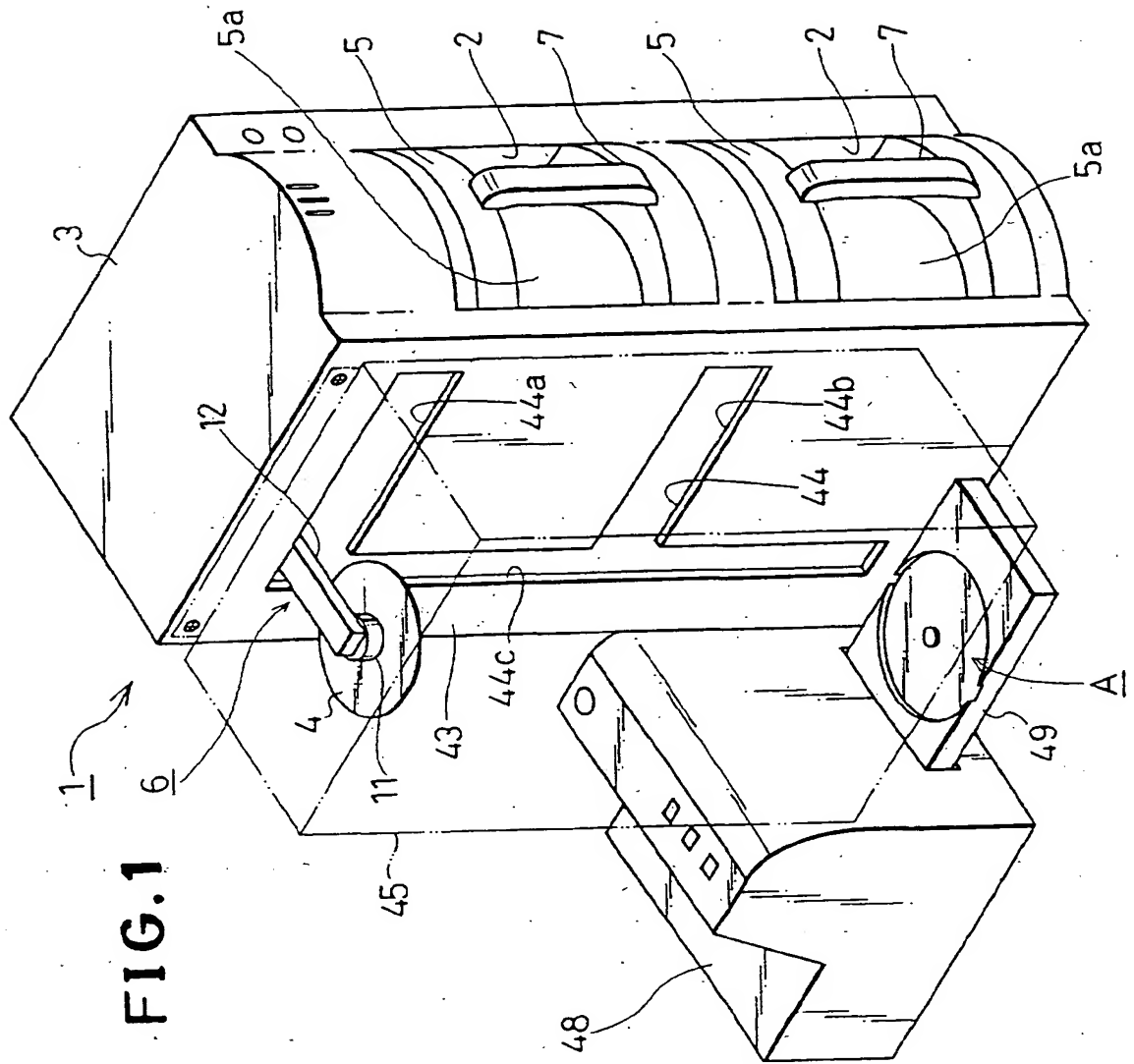


FIG. 2

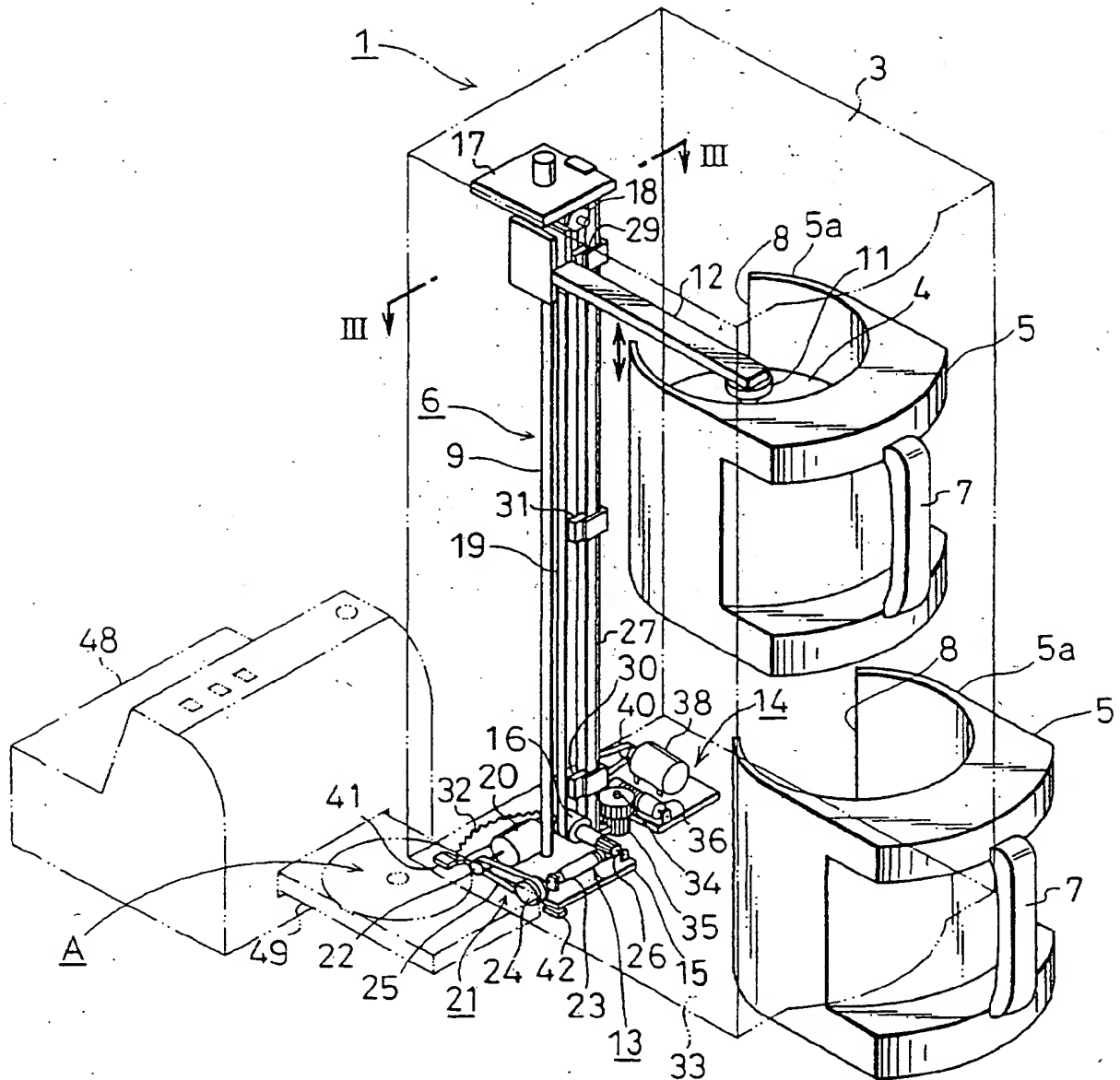


FIG. 3

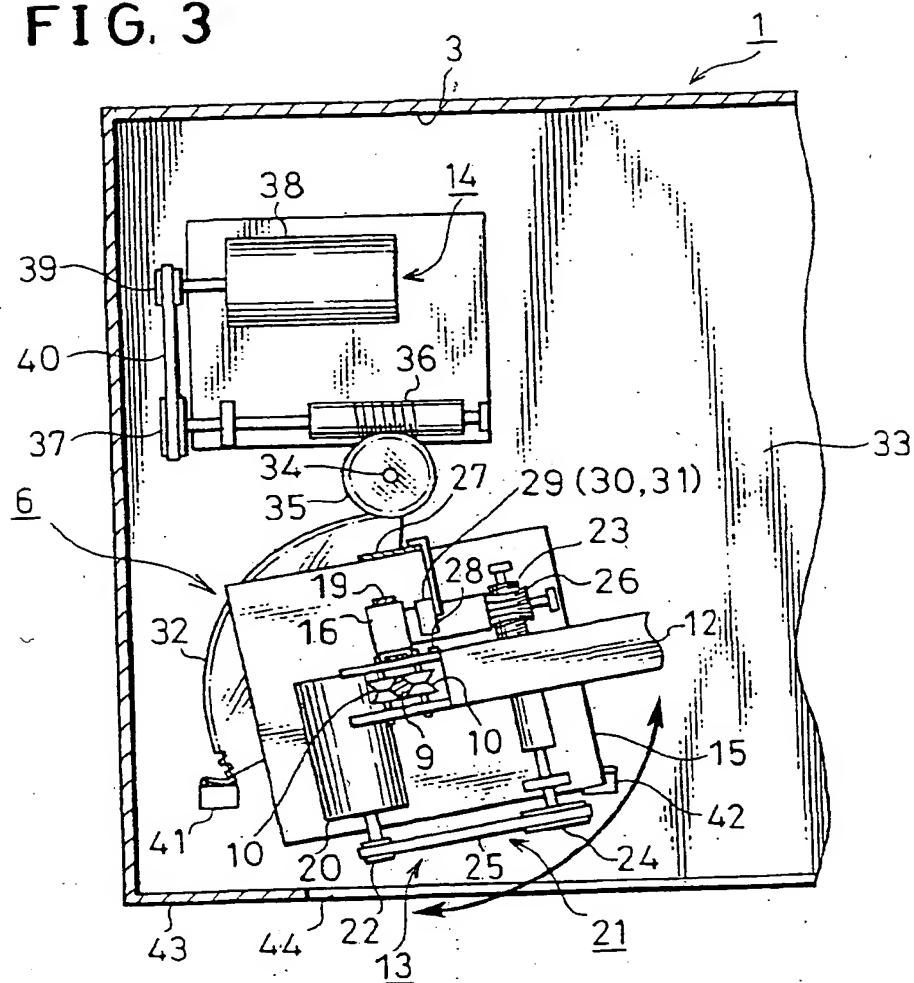


FIG.4

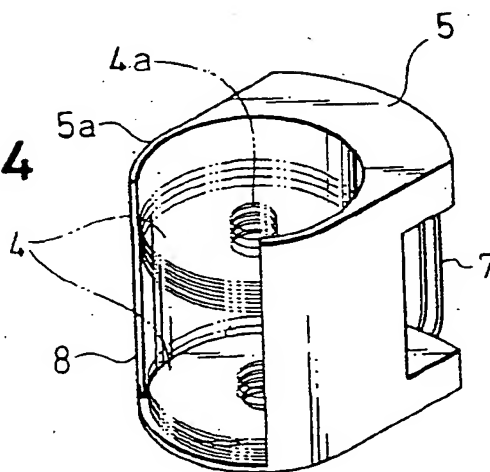


FIG. 5

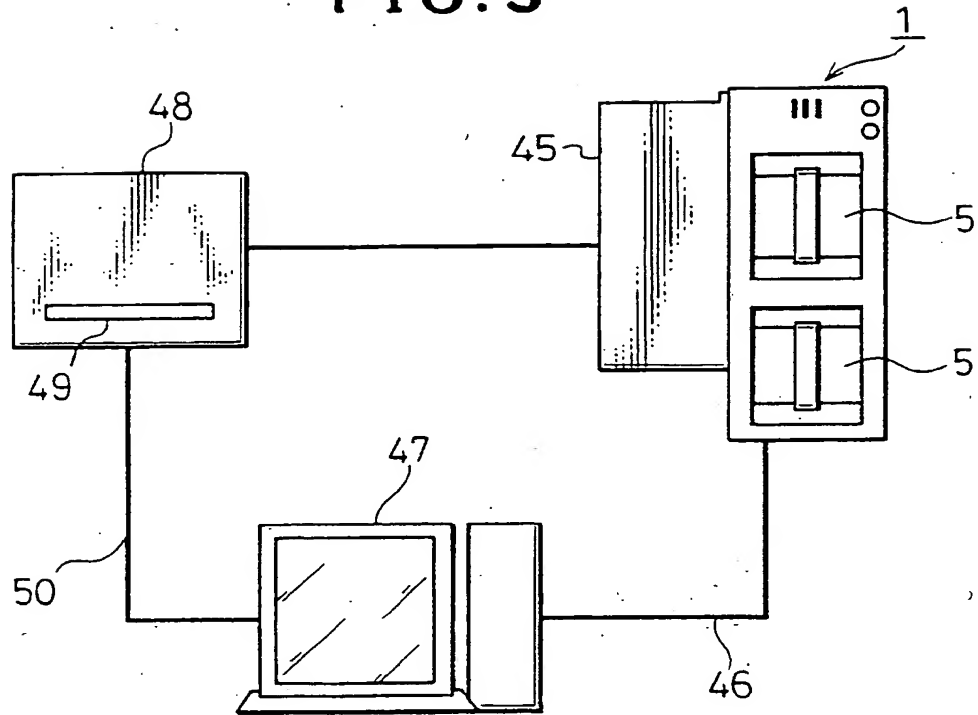


FIG. 6

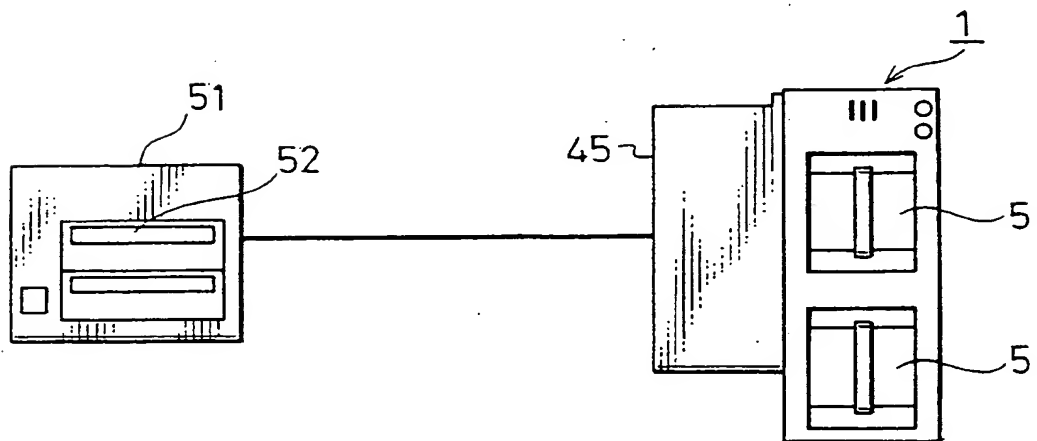
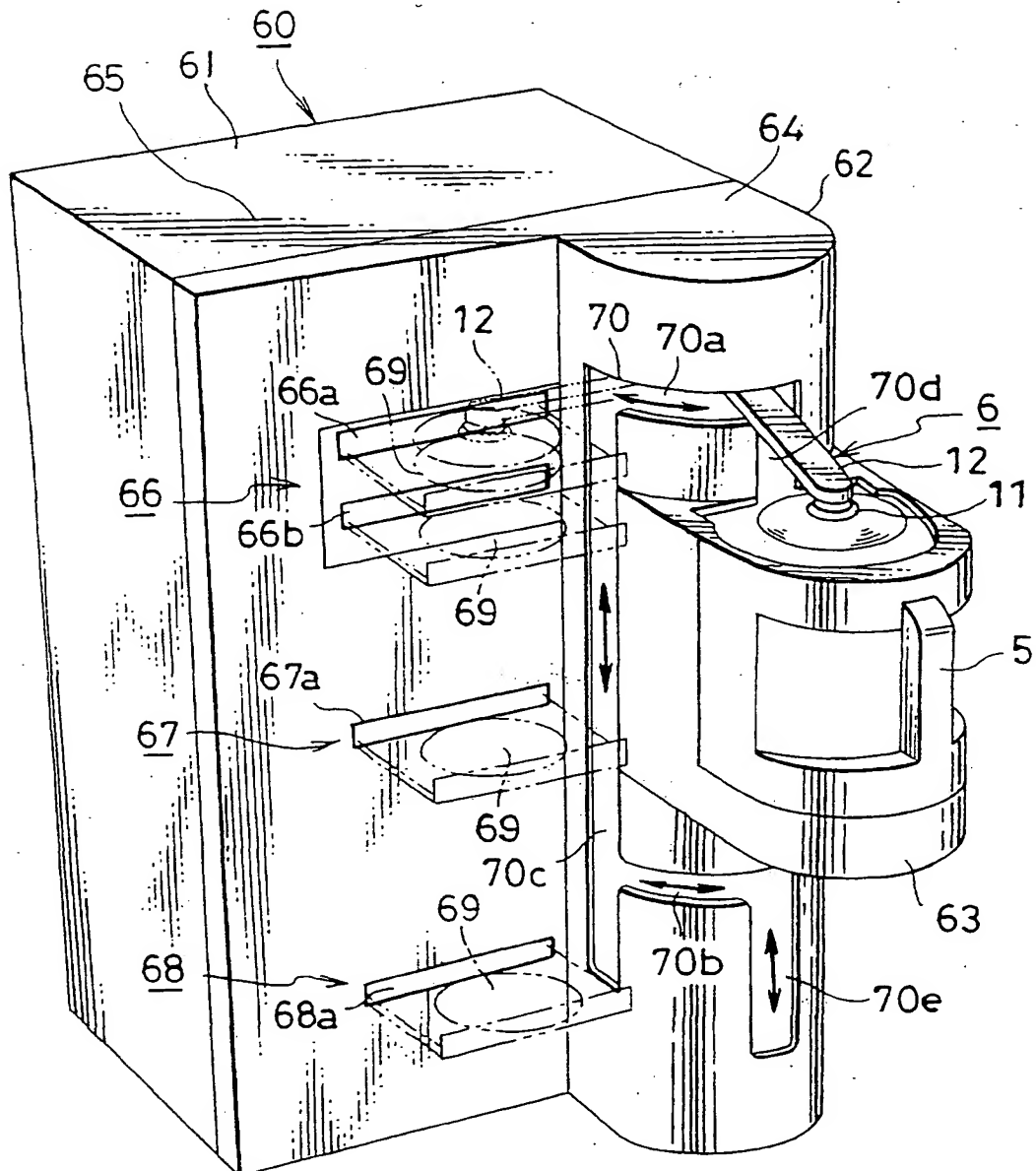


FIG. 7





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EUROPEAN SEARCH REPORT

Application Number
EP 01 30 0684

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 4 789 209 A (TERANISHI SHUNICHI) 6 December 1988 (1988-12-06)	1-3,5-11	G11B17/08 G11B7/26
Y	* column 2, line 52 - column 3, line 43; figures 1-5 *	4	
Y,D	--- PATENT ABSTRACTS OF JAPAN - vol. 1999, no. 12, 29 October 1999 (1999-10-29) & JP 11 185306 A (NICE TEC:KK), 9 July 1999 (1999-07-09) * abstract *	4	
X	--- FR 2 610 755 A (POINCENOT RENE) 12 August 1988 (1988-08-12)	1,5,12, 14	
Y	* page 6, column 31 - page 7, column 30; figures 4-7 *	13,15	
Y,D	--- US 5 734 629 A (HARO ROGER E ET AL) 31 March 1998 (1998-03-31) * the whole document *	13,15	
X	--- US 5 910 939 A (OKUDA KENJI ET AL) 8 June 1999 (1999-06-08) * figures 3,4 *	16	TECHNICAL FIELDS SEARCHED (Int.Cl.7) G11B B41J
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 May 2001	Examiner Sozzi, R
CATEGORY OF CITED DOCUMENTS		I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document	

EPO FORM 1503 05/82 (P04C31)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82